

**FEASIBILITY STUDY WORK PLAN  
16th STREET and CAMELBACK  
WQARF REGISTRY SITE  
PHOENIX, ARIZONA**



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## TABLE OF CONTENTS

<b>LIST OF ABBREVIATIONS &amp; ACRONYMS .....</b>	<b>ii</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
<b>1.1 Purpose.....</b>	<b>1</b>
<b>1.2 Site Description .....</b>	<b>1</b>
<b>2.0 FEASIBILITY STUDY TASKS .....</b>	<b>3</b>
<b>2.1 Remedial Objectives .....</b>	<b>4</b>
<b>2.2 Development and Screening of Remedial Measures.....</b>	<b>4</b>
<b>2.3 Development of Reference Remedy and Alternative Remedies .....</b>	<b>5</b>
<b>3.0 COMMUNITY INVOLVEMENT.....</b>	<b>6</b>
<b>4.0 FEASIBILITY STUDY REPORT FORMAT .....</b>	<b>6</b>
<b>5.0 REFERENCES.....</b>	<b>7</b>

## FIGURES

**Figure 1. 16th Street and Camelback WQARF Site – Phoenix, Arizona**

**Figure 2. Monitor Well Locations With Areas of Concern**

## **LIST OF ABBREVIATIONS & ACRONYMS**

A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
A.R.S.	Arizona Revised Statutes
COC	Contaminants of Concern
1,2-DCA	1,2-Dichloroethane
1,2-DCP	1,2-Dichloropropane
EA	Environmental Assessment
FS	Feasibility Study
MW	Monitor Well
PCE	Tetrachloroethene
RO	Remedial Objectives
RI	Remedial Investigation
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WP	Work Plan
WQARF	Water Quality Assurance Revolving Fund

# **1.0 INTRODUCTION**

## **1.1 Purpose**

This Work Plan (WP) presents the methodology that will be followed for completion of the feasibility study (FS) for the 16th Street and Camelback Water Quality Assurance Revolving Fund (WQARF) site (the site) in Phoenix, Arizona. This work plan is required as part of the FS process, pursuant to Arizona Administrative Code (A.A.C.) R18-16-407(B).

The purpose of the FS is to develop and evaluate a reference remedy and alternative remedies that are capable of achieving the site's Remedial Objectives (ROs). An FS report will be developed that relies on data and information from the Remedial Investigation (RI), and further work that may be conducted during the FS, and will evaluate the reference remedy and at least two alternative remedies, to ensure that each remedy meets the following in accordance with A.A.C. R18-16-407(H):

- Achieves the ROs;
- is consistent with water management plans and general land use plans; and
- is evaluated with comparison criteria including practicability, risk, cost, and benefit.

One of the alternative remedies will be less aggressive than the reference remedy and one will be more aggressive as required by A.A.C. R18-16-407(E).

In accordance with A.A.C. R18-16-407(I), based on the evaluation of the reference remedy and the alternative remedies, the proposed remedy will be developed and described in the FS report. The FS report shall describe the reasons for selecting the remedy including all of the following:

- how the proposed remedy will achieve the ROs;
- how the comparison criteria were considered; and
- how the proposed remedy meets the requirements of Arizona Revised Statutes (A.R.S.) §49-282.06.

## **1.2 Site Description**

The site is located in Phoenix, Arizona. The contaminated groundwater plume is bounded by Camelback Road to the north, Highland Avenue to the south, 17th Street to the east, and 15th Street to the west (Figure 1).

The purpose of the RI was to determine the nature and extent of contamination at the site. The RI also identified present and reasonably foreseeable uses of land and waters of the state that have been or are threatened to be impacted by the contamination. Based upon the data collected, the following represents the interpretations and conclusions reached as a result of the RI (Arizona Department of Environmental Quality [ADEQ], 2015).

The property was acquired by Bank One through foreclosure on December 4, 1989. Bank One retained several environmental consultants to conduct Phase I, II, and III environmental assessments (EAs) and investigations. Law Engineering Inc. was retained by Valley National Bank and prepared the Phase I Environmental Assessment report in September 1992 and the Phase II and III reports in April 1993 for the Camelback Arboleda property. The general location of the Site is shown on Figure 1.

Three groundwater monitor wells were installed in November 1992. Monitoring wells (MW)-1 and MW-2 were placed downgradient from the former dry-cleaning facility, and one monitor well, MW-3, was placed downgradient of the former service station (Figure 2). Three additional monitor wells (MW-4, MW-5, MW-6) were installed in December 1992 (MW-4 was abandoned shortly after installation because it was not on the Site property). These investigations disclosed total petroleum hydrocarbon contaminated soil and groundwater contaminated with tetrachloroethene (PCE), 1,2-dichloroethane (1,2-DCA), benzene, and list environmental concerns/potential sources. The suspected source of PCE was a former dry cleaner that was located on the northern portion of the property. The groundwater contamination was partially delineated in the Phase III report. In 1993, GZA GeoEnvironmental, Inc. excavated and thermally remediated 405 tons of petroleum contaminated soil and removed one 1,000 gallon underground storage tank (UST) from the Site. Characterization of this UST site indicated that this UST was not likely a contributor to known groundwater contamination at the Site.

In April 1993, Bank One approached the ADEQ to consider reaching a “settlement agreement” regarding the property located at the southeast corner of 16<sup>th</sup> Street and Camelback Road. ADEQ and Bank One entered into a Consent Decree in January 1994. ADEQ received all the previous investigation and remediation reports from Bank One in addition to a sum of \$399,000.00 towards future costs for investigations and remediation at the Site. Bank One entered into the Consent Decree alleging it was not liable as a responsible party based on “secured labor liability exemptions.”

In 1995, ADEQ lead a soil vapor survey performed by HydroGeoChem, Inc. ADEQ referenced previous EA work in this report and distinguished between the PCE groundwater contamination in the “Northern Plume” associated with the former dry cleaner, and 1,2-DCA and 1,2-dichloropropane (1,2-DCP) groundwater contamination in the “Southern Plume” associated with the former UST. Trace concentrations of volatile organic compounds (VOCs), notably PCE, were detected in soil vapor samples; however, these did not indicate an ongoing PCE source at or near the suspected former dry cleaner in the North Plume.

In 1996, ADEQ expanded the groundwater monitoring network by installing four monitoring wells (MW-7, MW-8, MW-9 and MW-10). Information gathered from the expansion of the monitoring well network did not identify ongoing sources or conclusively identify the extent of groundwater contamination.

In 1999, the Site was added to the WQARF Registry with an eligibility and evaluation score of 23 out of 120. In a work plan dated December 1999, Kleinfelder references two contaminant

plumes in groundwater at the Site, a PCE in the northern portion, and 1,2-DCA and 1,2-DCP plumes in the southern portion. In May 2000 monitoring well MW-11 was constructed under the direction of ADEQ to further characterize the extent of groundwater contamination at the Site.

In May 2002, ADEQ commenced an ERA evaluation at the Site designed to determine if soil vapor extraction (SVE) with air-sparge remediation was feasible to provide source control and remediate PCE contaminated groundwater. A pilot study was conducted on the northern PCE plume near monitoring well MW-1 (Figure 2). In January 2003, two SVE wells and one AS well were constructed along with observation well OW-1D. According to ADEQ, pilot test results indicated that a remediation system at the Site would not be feasible or cost effective, and in May 2004 an ERA completion report was completed by Kleinfelder.

In June 2004, groundwater monitor well MW-12 was installed to help define the downgradient extent of contamination in the North Plume. Declining water levels necessitated the use of passive diffusion bags in 2004, and in April 2006 monitor well MW-3 was replaced by monitor well MW-3A due to continued declining groundwater levels. Groundwater monitoring continued until 2007 when RI activities were suspended due to ADEQ budget constraints. The last groundwater monitoring report for the Site prior to the hiatus in RI activities was issued following the fourth quarter 2007 monitoring event. Groundwater monitoring and characterization activities were resumed in May 2013.

Land use in the area around the site is zoned for Commercial use. There is no appreciable surface water within the site boundaries. Groundwater is used for irrigation in the vicinity of the site. There are no identified potential receptors most likely to be influenced by further downgradient progress of releases from the site.

## **2.0 FEASIBILITY STUDY TASKS**

This section discusses the tasks associated with the development of the FS report. The FS tasks will be performed in order to meet the requirements of A.A.C. R18-16-407. The FS process considers the data gathered during the RI and further work that may be conducted during the FS and;

- considers the ROs;
- includes the identification of potential treatment and containment technologies that satisfy the ROs;
- includes remedial technology screening;
- includes the development and analysis of remediation alternatives and technologies; and
- includes a comparison of the remedies and proposes a remedy.

## **2.1 Remedial Objectives**

The ROs developed as part of the RI process, pursuant to A.A.C. R18-16-406(I), were based on field investigation results, the land and water use surveys, the screening level risk evaluation, ADEQ input and input from the community during the draft RO Report public comment period. ROs are used during remedial alternatives development to identify appropriate remedial technologies.

## **2.2 Development and Screening of Remedial Measures**

Remedial measures are remediation technologies or methodologies, and are screened based on anticipated removal or reduction of contaminants at a site and the ability to achieve the ROs. The FS evaluation will look at future risk under reasonably foreseeable uses of the site and surrounding properties. Typically, appropriate remediation alternatives and technologies are screened using the following criteria:

- compatibility with current and reasonably foreseeable land use,
- contaminant of concern (COC) treatment effectiveness,
- regulatory requirements,
- constructability,
- operation and maintenance requirements,
- health and safety considerations,
- generation and management of waste products,
- flexibility/expandability, and
- cost.

Selected remedial measures will then be assembled with selected strategies to develop the reference remedy and alternative remedies. The remedial strategies to be developed, consistent with A.A.C. R18-16-407(F), are listed below. Source control shall be considered as an element of the reference remedy and all alternative remedies, if applicable, except for the monitoring and no action strategies. A strategy may incorporate more than one remedial measure.

- plume remediation;
- physical containment;
- controlled migration;
- source control;
- monitoring; and,
- no action alternative.

## **2.3 Development of Reference Remedy and Alternative Remedies**

Based upon the retained remedial measures and strategies, a reference remedy and two alternative remedies will be developed as described in A.A.C. R18-16-407(E). The combination of the remedial strategy and the remedial measures for each alternative remedy shall achieve the ROs. The reference remedy and any alternative remedy also may include contingent remedial strategies or remedial measures to address reasonable uncertainties regarding the achievement of ROs or uncertain time-frames in which ROs will be achieved. The reference remedy and alternative remedies will be described in the FS report in sufficient detail to allow evaluation using the comparison criteria, but plans at construction level details are not required at this time. Standard measurements for comparison of alternative remedies are included in appendix A of A.A.C. R18-16-407 and may be used, as applicable, for comparison of the relevant factors. Where appropriate, the reference remedy and an alternative remedies may incorporate different strategies for different aquifers, or portions of aquifers.

The reference remedy shall be developed based upon best engineering, geological, or hydrogeological judgment following engineering, geological, or hydrogeological standards of practice, considering the following:

- the information in the RI;
- the best available scientific information concerning available remedial technologies,
- preliminary analysis of the comparison criteria and the ability of the reference remedy to comply with A.R.S. §49-282.06.

At a minimum, at least two alternative remedies shall be developed for comparison with the reference remedy. At least one of the alternative remedies must employ a remedial strategy or combination of strategies that is more aggressive than the reference remedy, and at least one of the alternative remedies must employ a remedial strategy or combination of strategies that is less aggressive than the reference remedy. A more aggressive strategy is a strategy that requires fewer remedial measures to achieve the ROs; a strategy that achieves the ROs in a shorter period of time; or a strategy that is more certain in the long term and requires fewer contingencies.

In accordance A.A.C. R18-16-407(G), in identifying remedial measures, the needs of the well owners and the water providers and their customers will be considered, including quantity and quality of water, water rights, and other legal constraints on water supplies, reliability of water suppliers and any operational implications. Such remedial measures may include, but will not be limited to, well replacement, well modification, water treatment, provision of replacement water supplies and engineering controls. Where remedial measures are relied upon to achieve ROs, such remedial measures will remain in effect as long as required to ensure the continued achievement of those objectives.

A comparative evaluation of the reference remedy and the alternative remedies developed will be conducted. In accordance with A.A.C.18-16-407(H), each remedy will be evaluated using the following:



- A demonstration that the remedial alternative will achieve the ROs.
- An evaluation of consistency with the water management plans of the affected water providers and the general land use plans of the local governments with land use jurisdiction.
- An evaluation of the comparison criteria, including:
  - a. practicability of the alternative;
  - b. an evaluation of risk, including the overall protectiveness of public health and aquatic and terrestrial biota;
  - c. cost of the alternative;
  - d. benefit or value the alternative;
  - e. a discussion of the comparison criteria as evaluated in relation to each other.

Based upon the evaluation and comparison of the reference remedy and the other alternative remedies developed, a proposed remedy will be developed and described in the FS in accordance with A.A.C. R18-16-407(I). The FS report shall describe the reasons for selection of the proposed remedy including the following:

- how the proposed remedy will achieve the ROs;
- how the comparison criteria were considered; and
- how the proposed remedy meets the requirements of A.R.S. §49-282.06.

### **3.0 COMMUNITY INVOLVEMENT**

ADEQ will issue a Notice to the Public announcing availability of the work plan to implement the Feasibility Study on ADEQ's website at [www.azdeq.gov](http://www.azdeq.gov). The notice may be mailed to the Public Mailing List for the site; water providers, the Community Advisory Board, and any other interested parties.

### **4.0 FEASIBILITY STUDY REPORT FORMAT**

An FS report will be prepared documenting the FS process. The FS report will be organized into the following sections:

- **Section 1.0 INTRODUCTION**  
This section will summarize the purpose of the FS report.
- **Section 2.0 SITE BACKGROUND**

This section will present a summary of the site description, physiographic setting, nature and extent of contamination and a risk evaluation.

- **Section 3.0 FEASIBILITY STUDY SCOPING**

This section will present the regulatory requirements presented in statute and rule, delineate the remediation areas and present the ROs identified in the RI.

- **Section 4.0 IDENTIFICATION AND SCREENING OF REMEDIAL MEASURES AND REMEDIAL STRATEGIES**

This section will present the evaluation and screening of various remedial measures and strategies related to contamination in soil and groundwater and lists the technologies that have been retained for evaluation as part of the reference and alternative remedies pursuant to A.A.C. R18-16-407(E)(F).

- **Section 5.0 DEVELOPMENT OF REFERENCE REMEDY AND ALTERNATIVE REMEDIES**

This section will present the selected reference remedy, and at a minimum, a more aggressive remedy and a less aggressive remedy. Each remedy will include a discussion of the associated remedial measures and remedial strategies pursuant to A.A.C. R18-16-407(E).

- **Section 6.0 DETAILED COMPARISON OF THE REFERENCE REMEDY AND THE ALTERNATIVE REMEDIES**

The remedies will be compared to each other based on the comparison criteria of practicability, cost, risk and benefit. Uncertainties, if identified, associated with each remedy or comparison criteria will be discussed pursuant to A.A.C. R18-16-407(H).

- **Section 7.0 PROPOSED REMEDY**

This section will present the proposed remedy as required in A.A.C. R18-16-407(I), and discusses how it will achieve the ROs, how the comparison criteria were considered, and how the proposed remedy will meet the requirements of A.R.S. §49-282.06.

- **Section 8.0 COMMUNITY INVOLVEMENT**

This section will document the community involvement activities conducted in association with the FS.

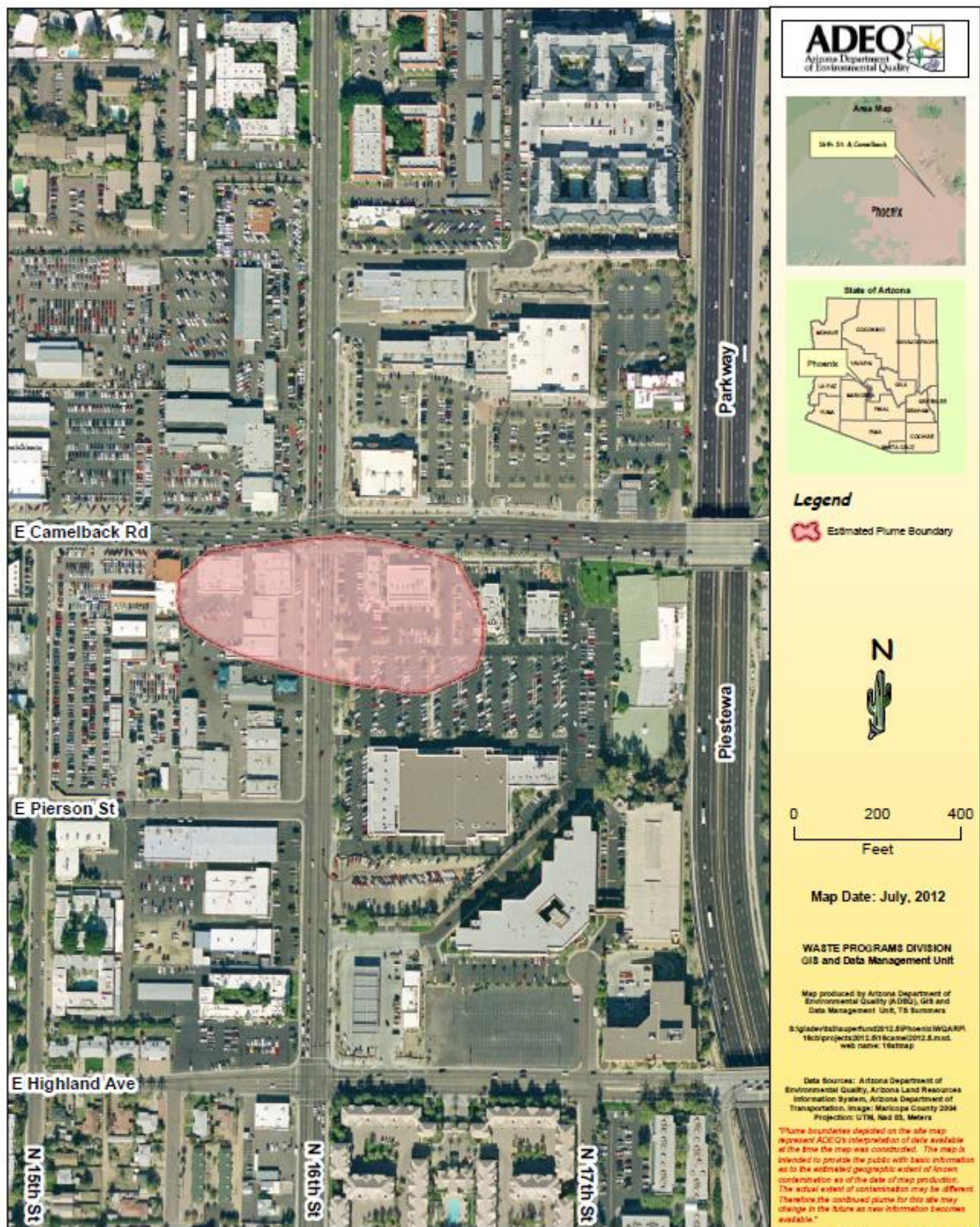
## **5.0 REFERENCES**

Arizona Department of Environmental Quality (ADEQ). 2015. *Remedial Investigation Report*, 16<sup>th</sup> Street and Camelback Road WQARF Site, Phoenix, Arizona. Month???? Day??, 2015.

## FIGURES

Figure 1

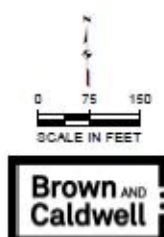
16th Street and Camelback WQARF Site - Phoenix, Arizona







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- EXPLANATION**
- MONITOR WELL
  - OBSERVATION WELL
  - REPLACEMENT MONITOR WELL
  - FORMER BUILDING LOCATION

**Figure 2**  
**MONITOR WELL LOCATIONS**  
**WITH AREAS OF CONCERN**  
 REMEDIAL INVESTIGATION  
 SUMMARY REPORT  
 16TH STREET AND CAMELBACK WQARF SITE  
 PHOENIX, ARIZONA